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SOME NEW CANADIAN SCATOPHAGIDAE (DIPTERA).*

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The family Scatophagidae, which is richly represented in the northern parts of America and the Old World, is particularly well represented in Canada and most of the species described from America occur in this country. At least some of our species referred to genera established for Palaearctic forms belong doubtfully to these genera and the determination of species is rendered very difficult because the majority of our species have been described in the genus *Cordilura*. An examination of Loew's types has enabled me to place his species and to determine that a great many of those in the Canadian National Collection are undescribed and descriptions of some of these are now given. Others will be described in a complete revision of the family now under preparation.

Gonarecticoides n. Gen.

Face but little retreating below, the oral margin slightly produced, front gently sloping, with a pair of strong cruciate bristles in the frontal vitta above, and six or seven frontals, three or four of which are in the upper, divergent series; ocellars long; verticals long, outer pair of verticals fairly long, post verticals rather weak, situated behind the verticals. Palpi short, compressed, not broad, without apical bristle. Antennae reaching the oral margin, the third segment three times as long as the second, very broad, the lower apex rounded, the upper apex rather acutely rounded, not acute; arista with the penultimate segment four times as long as wide, the apical segment thickened on half its length. Cheeks half as wide as eye-height, the eyes oval. Hair of occiput sparse, coarse black.

Acrostical hairs short, in two irregular, complete rows; dorso-centrals, 2-3; one sub-lateral, two intra-alars, two supra-alars and a weak prealar; scattered hairs on the mesonotum behind the suture but only one or two in front outside the acrosticals; three pairs of scutellars, the second pair weak; three long, fine sterno-pleurals. There are no distinct prescutellar or stigmal bristles but the areas are clothed with long, rather coarse, black hair while the median portion of the propleura is quite bare.

Legs with long, coarse black hair from which the bristles are only weakly differentiated. The anterior femora bear a row of bristles near the upper edge of the anterior (inner) surface on the sub-apical half while their tibiae bear three antero-dorsal bristles on the basal half and some long, poorly differentiated posterior bristles; middle femora with three strong, curved, pre-apical posterior bristles, their tibiae with four postero-dorsal, three antero-dorsal and an incomplete row of antero-ventral bristles which do not extend onto the basal third. Posterior femora with the complete row of antero-dorsal and antero-ventral bristles poorly differentiated, their tibiae with an entire row of postero-dorsal,

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

antero-dorsal and antero-ventral bristly hairs, between which are other, scarcely weaker, erect bristly hairs. The first segment of the posterior tarsi of the male is arcuate and bears a large basal tubercle postero-ventrally.

Wings normal in shape; posterior crossvein rectangular, straight, half its length from wing-margin, first vein bare; anal vein complete.

Abdomen slightly clubbed, short, the genitalia unusually large, the hair abundant, erect, the apical three segments with marginal bristles except medianly.

Genotype: *Gonarticoidea argenteiceps* n. sp.

***Gonarticoidea argenteiceps* n. sp.**

Black, the face, anterior half of cheeks and lower half of the front, reddish yellow, the frontal vitta orange on anterior half. Length 6 mm.

Male. Pale parts of the head, including the rather blackened facial depression, white pollinose, the upper half of the front similarly pollinose inside the parafrontals which bear brownish yellow pollen. Pollen of the ocellar triangle and posterior orbits brown, elsewhere grayish, the ocellar triangle surrounded by a bare area except behind. Palpi reddish brown, with black hairs. Second antennal segment reddish, the antennae white pollinose.

Mesonotum whitish gray pollinose with a rather broad median brown vitta, the scutellum gray with the border brownish. Pleura brown, the sternum gray.

Legs moderately grayish pollinose, wholly black haired.

Wings cinereous hyaline, the veins black, yellowish basally. Squamae white, with white fringe. Halteres brown with the stem reddish on basal half.

Abdomen shining black, with a trace of grayish pollen.

Holotype—♂, Ottawa, Ont., May 18, 1927 (Curran), No. 2607 in the Canadian National Collection, Ottawa. Taken along the banks of the Ottawa river.

***Pselaphophila argyriceps* n. sp.**

Black, the face, cheeks and palpi silvery white, frontal vitta reddish on anterior half; tibiae and anterior four tarsi reddish yellow. Length, 6 mm.

Male. Frontal vitta opaque black above, with whitish sheen, parafrontals olivaceous pollinose except below; occiput gray pollinose, yellowish pilose below the neck; palpi long, rather broad, with white hair. Antennae deep black, the second arisal segment two and a half times as long as wide; third antennal segment angulate above, rounded below.

Thorax gray pollinose, with a narrow brown vitta along each dorso-central row; prealar half as long as following bristle. Hair of pleura yellowish. One pair of strong scutellars and a pair of erect terminal bristly hairs.

Femora gray pollinose, broadly reddish apically; coxae gray pollinose and yellow pilose, the posterior pair with one or two black bristles externally. Anterior tibiae with two antero-dorsal, one postero-dorsal and one posterior bristle; middle tibiae with two strong postero-dorsal and antero-dorsal bristles and fringed on each side below by a row of long, fine bristles which become obsolete basally, the ventral hair long; the posterior tibiae with three antero-dorsal and postero-dorsal bristles. Hair on under surface of femora, long, fine and yellow.

Wings cinereous hyaline, rather luteous in front of second vein; veins bare. Squamae white. Halteres reddish yellow.

Abdomen thickly grayish pollinose; the base, sides and venter pale yellow-

ish haired, each segment with six long, marginal bristles. Lobes of fifth sternite elongate, projecting, rounded apically, with short, black hair.

Holotype—♂, Ottawa, Ont., May 18, 1927 (Curran), No. 2608 in the Canadian National Collection, Ottawa.

***Pycnoglossa varipes* n. sp.**

Black, the face, cheeks, anterior half of the front and the tibiae, yellow; femora reddish, the anterior pair and all the tarsi, black. Length 5 mm.

Female. Head black; gray pollinose, rather silvery on the face and cheeks; frontal vitta brownish above; hair wholly black, bristle-like. Cheeks one-third as wide as eye-height. Palpi brown. Antennae deep black; arista moderately short plumose.

Thorax thickly gray pollinose, the mesonotal pollen with ochreous tinge. A few scattered acrostical hairs in a single row. Bristles long and strong; prealar long; one intra-alar; dorsocentrals 2-3; sternopleurals 3; two pairs of marginal scutellars, propleural and stigmal strong.

Coxae and femora gray pollinose, the trochanters and broad apex of the anterior femora yellowish. Front tibiae with two antero and postero-dorsal and one or two posterior bristles; middle tibiae with two antero and postero-dorsal and one anterior and posterior bristles, the posterior tibiae with three antero and postero-dorsal, one posterior and two postero-ventral bristles. The middle femora bear a row of anterior bristles on the basal half.

Wings cinereous hyaline, the veins brownish, luteous on basal half, the first vein with two or three scattered setulae on apical half; costa with strong setae and fairly strong costal spine. Squamae white, the halteres pale yellowish.

Abdomen densely grayish yellow pollinose, each segment with a row of strong marginals which are weak medianly on the first segment.

Type—♀, Sand Lake, Muskoka Dist., Ontario, June 28, 1926 (F. P. Ide), No. 2614 in the Canadian National Collection, Ottawa.

***Tricopalpus nigribasis* n. sp.**

Black, thickly grayish and brownish pollinose; legs reddish; face, cheeks and broad anterior border of front yellowish. Length 5 to 5.5 mm.

Male. Face, cheeks and anterior fourth of front yellow, the facial plate usually much paler, but sometimes the whole is whitish yellow, the frontal vitta rarely reddish on the anterior half, not noticeably pollinose, the cheeks white pollinose behind. Front opaque black, the parafrontals, vertex and occiput gray pollinose, rather silvery. Hair of lower half of occiput yellowish, above bristly and black. Cheeks one-eighth as wide as eye-height. Palpi yellow, paler apically, black or brown basally; with mixed black and yellow hairs and bristles. Antennae deep black.

Mesonotum brownish pollinose, its border, scutellum and pleura grayish; dorsocentrals 2-3; prealar short. Hair black, yellowish on the sternopleura, propleura and sternum, sometimes black above on the sternopleura.

Legs reddish, tips of middle and hind femora black; coxae black, gray pollinose, yellow pilose, the posterior four with black bristles. The second to fourth tarsal segments are brown on the apical half or more. Hair of legs rather long, black. Anterior tibiae with one dorsal and one posterior bristle, the middle pair with an antero-dorsal and antero-ventral bristle; posterior tibiae with two

bristles on antero-dorsal and antero-ventral surfaces.

Wings grayish, half the veins luteous; veins bare. Halteres yellow.

Abdomen brownish pollinose, gray laterally and ventrally and on the posterior borders of the segments. Hair conspicuous, long laterally and apically, black, on the basal four sternites, yellow.

Female. The palpi are broader, reddish yellow, black on basal fourth to half and the hair is shorter.

Holotype—♂, Banff, Alta., Aug. 23, 1922 (C. B. D. Garrett), No. 2606 in the Canadian National Collection, Ottawa.

Allotype—♀, Banff, Alta., Aug. 24, 1922 (C. B. D. Garrett).

Paratypes—♂ ♀, Banff, Alta., Aug. 24, 1922; ♂ 2 ♀, Aug. 18, 1922 and ♀, July 7, 1922 (Garrett); ♂, Winnipeg Beach, Man., July 2, 1923 (A. J. Hunter); ♀, Saskatoon, Sask., Aug. 27, 1925 (K. M. King); ♀, St. Cloud, Man., Aug. 2, 1923, (N. Criddle); 3 ♀, Victoria Beach, Man., Aug. 8, 1925, (N. Criddle); ♀, Victoria, B. C., June 16, 1923 (K. F. Auden).

***Spaziphora cincta litoralis* n. var.**

This form agrees with *S. cincta* Lw. in all respects but differs in having the femora black, broadly reddish at the apices, rarely narrowly reddish at the base and gray pollinose. The middle and posterior tibiae, or at least the latter, are sometimes brownish on most of their length. Structurally there is no difference in the two forms, although the variety appears considerably darker.

Holotype—♂, Ottawa, Ont., May 18, 1927 (Curran), No. 2609 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes:—6 ♂, 5 ♀, same data: 1 ♂, 2 ♀, Britannia, Ont., May 17, 1927 and 15 ♂, 4 ♀, Britannia, May 18, 1927, (G. S. Walley); ♀, Ottawa, May 8, 1912, (J. I. Beaulne), and ♀, Aylmer, Que., May 19, 1927, (Curran).

This species occurs on the breakwater at Britannia and on stones along the banks of the Ottawa River.

***Microprosopa diversipes* n. sp.**

Black, the anterior half of the front reddish, legs reddish yellow and black; genital segments reddish. Length 4.5 mm.

Female. Sides of front gray pollinose below, the front above and the occiput with brownish yellow pollen except at the sides of the ocellar triangle. Hair black above, pale yellowish on lower half of head. Face and cheeks whitish, the former with a broad, obscure, slightly darker band on upper half. Palpi whitish yellow, white haired, fairly broad. Antennae deep black, brownish pollinose.

Thorax gray pollinose, with slight brownish tinge above and four very obscure darker vittae. Hair pale on the pleura, elsewhere black.

Anterior coxae obscurely yellowish on apical half in front; anterior femora blackish on more than basal half, the middle femora with a broad black stripe on basal half of under surface, the black parts gray pollinose, the legs elsewhere reddish. Coxae gray pollinose, yellow pilose; apical tarsal segments brownish. Front tibiae with a median dorsal bristle; middle tibiae with an antero-dorsal and postero-dorsal beyond the middle, the posterior pair with two antero-dorsal and one postero-dorsal bristle, the posterior femora with three widely spaced antero-ventral bristles on the apical half.

Abdomen moderately gray pollinose, a shining black area on each side of the apical segment basally; hair black, appressed, pale only on the sides basally and on the basal four sternites.

Holotype—♀, Banff, Alta., July 20, 1922, (C. B. D. Garrett), No. 2611 in the Canadian National Collection, Ottawa.

It does not seem likely that this can be the female of *melaneura* Zett. even though there is a slight indication of a darker facial band. The blackish front femora and different chaetotaxy of the legs will readily separate the species from any described from America.

***Microprosopa varicornis* n. sp.**

Black; the face, anterior two-thirds of front, basal two antennal segments, palpi, anterior coxae and legs reddish; hair and bristles yellowish, the apical scutellar pair black. Length 7 mm.

Female. Face and front yellowish white pollinose, the occipital pollen with ochreous tinge. Cheeks seven-sixteenths as wide as eye-height; third antennal segment deep black, about one and three-fourths as long as second; arista brown, bare.

Thorax gray pollinose, the discal pollen with brownish tinge, four bare vittae, the median pair widely separated, narrow, not nearly reaching the scutellum; outer pair wide, interrupted, abbreviated at both ends; basal scutellar bristles strong; two rows of acrostical hairs.

Coxae and tarsi grayish pollinose; anterior legs without bristles, middle femora with one anterior and one posterior preapical, yellow bristle; middle tibiae with a single black antero-dorsal bristle beyond the middle; posterior femora with three black antero-ventral bristles on apical fourth, and two or three postero-ventrals; posterior tibiae with two antero-dorsal and one postero-dorsal bristles. Middle and hind tibiae and all the tarsi black haired.

Wings cinereous hyaline; veins reddish brown; apex of wing rounded as in *triseta* Mall.; veins bare. Halteres reddish.

Abdomen conspicuously grayish pollinose, the broad sides, except basally, and the apex bare.

Holotype—♀, Okanagan, B. C., August, No. 2613 in the Canadian National Collection, Ottawa.

Close to *triseta* Malloch but differing in the pale basal antennal segments and color of the bristles on the body.

***Cordylurella rufula* n. sp.**

Shining reddish, large spot on the occiput, the ocellar triangle, a rectangular spot on the front of the mesonotum and the abdominal incisures shining black. Length 4 mm.

Female. Face, cheeks and palpi yellowish, white pollinose; frontal orbits on lower half and the posterior orbits except above, white pollinose; six pairs of frontals in two series; hair of occiput black on upper half, pale yellowish below; oral vibrissae black. Proboscis blackish apically; antennae black; arista long pubescent. Cheeks one-seventh eye-height.

Thorax, from frontal view, very thinly yellowish pollinose. Prealar absent, two weak intra-alars; acrostical hairs, short, in two rows; one sternopleural; two pairs of scutellars. Pleural pile yellowish, short.

Legs wholly reddish; coxae white pollinose; legs pale haired, the bristles black; anterior tibiae with one dorsal bristle the middle and posterior pairs each with a single antero-dorsal bristle. Tarsi black haired.

Wings cinereous hyaline, the veins brown, luteous basally, bare. Squamae luteous; halteres yellow.

Narrow apices of the abdominal segments black; the genitalia mostly black. Hair black dorsally, yellow on the sides and venter, short and sparse; no bristles.

Holotype—♀, Aylmer, Que., July 4, 1924, (Curran), No. 2610 in the Canadian National Collection, Ottawa.

The third antennal segment of this species is somewhat less than twice as long as the second, whereas in *subvittata* Malloch, the genotype, it is only about one and a half times as long. Both species are small and slender, but the head of *subvittata* is damaged and the actual shape is problematical. It may be that the two species are not congeneric.

***Cordilura fasciventris* n. sp.**

Related to *praecusta* Lw. and *luteola* Mall. Distinguished from the former by the presence of acrostical hairs and from the latter by the wholly reddish tibiae. Rusty reddish, the apices of the abdominal segments shining black. Length 7 mm.

Female. Face and cheeks yellow, white pollinose; parafrontals and occiput thinly yellowish pollinose; hair below the neck pale yellowish. Cheeks about one-fourth as wide as eye-height. Proboscis rusty reddish. Palpi yellowish white, clothed with sparse, black bristly hairs. Apical half of third antennal segment and the arista black, the rays of the latter long.

Thorax thinly yellowish pollinose, with a broad, slightly darker vitta along the dorso-central rows. Sub-lateral weak; two rather weak intra-alars, prealar three-fourths as long as following bristle. Pleural pile yellowish. One pair of scutellars. Sternum with two or three bristles in front of middle coxae.

Front coxae yellowish, the coxae yellowish pollinose and pilose, bearing black bristles. Front tibiae with one antero and postero-dorsal bristle and two posterior; middle tibiae with two antero and postero-dorsal, two posterior and one ventral bristle; posterior tibiae with three antero and postero-dorsal and two antero-ventrals.

Wings with luteous tinge, grayish apically and posteriorly, the veins brown. First vein bare. Squamae and halteres yellowish white.

Narrow apex of each segment and the genitalia mostly, shining black, the sternites black, each segment with strong marginals but these are absent medianly on the first three segments.

Holotype—♀, Agassiz, B. C., May 1, 1921, (R. Glendenning), No. 2615 in the Canadian National Collection, Ottawa.

Paratype—♀, Mt. Washington, N. H., July 21, 1915, in the collection of the Boston Society of Natural History.

This species was recorded in Johnson's list of the Diptera of New England as *tricincta* Lw., but that species belongs to the genus *Hexamitocera* Becker and has *flavida* Coq. as a synonym. The other specimens recorded as *tricincta* are practically all *Megophthalma americana* Mall.

Acicephala Coq.

1. Femora black 2.
Femora yellow *polita* Coq.
2. Abdomen with at least the basal two segments yellow haired 3.
Abdomen wholly black haired *intermedia* n. sp.
3. Basal three abdominal segments of male and all of female yellow pilose *pilosella* Coq.
Only the basal two abdominal segments yellow haired *alberta* n. sp.

***Acicephala intermedia* n. sp.**

Black, the occiput and abdomen not pollinose; base of palpi, second antennal segment, broad apices of the femora, and the tibiae and tarsi reddish or reddish yellow. Length 7 mm.

Female. Broad oral margin, face and parafrontals yellowish gray pollinose, the blackish frontal vitta with a whitish sheen; hair wholly black.

Thorax moderately covered with gray pollen which has a yellowish tinge on the mesonotum. Acrosticals hair-like, dorso-centrals, 3-4; prealar two-thirds as long as following bristle; posterior notopleural short, two humerals; apical pair of scutellars fairly strong, cruciate; stigmal bristle present. Pleural hair black, pale only on the propleura.

Coxae thinly grayish pollinose, the anterior pair thickly so and yellow pilose. Apical sixth of the front and half of the posterior four femora reddish. Posterior tibiae with three antero-dorsal and two or three postero-dorsal bristles.

Wings cinereous hyaline, with luteous tinge anteriorly and basally, the veins brown, bordered with brownish, bare. Squamae yellow. Halteres brownish red.

Abdomen shining black, the basal segment thinly grayish pollinose, the hair wholly black.

Holotype—♀, Aweme, Man., July 4, 1926 (R. M. White), No. 2617 in the Canadian National Collection, Ottawa.

This species can hardly remain in *Acicephala* because of the presence of humeral and stigmatic bristles, but I place it here pending a revision of the family.

***Acicephala alberta* n. sp.**

Black, the tips of the femora, tibiae, tarsi and halteres reddish yellow. Length 6.5 to 7.5 mm.

Male and Female. Lower half of face, broad oral border and the front with the exception of the ocellar triangle, grayish yellow pollinose, the head elsewhere shining. Hair of occiput yellowish. Palpi brown, with coarse black and yellow bristly hair. Antennae dull black, thinly pollinose.

Thorax shining black above, the pleura and coxae densely yellowish gray pollinose. Hair short and yellow; about six pairs of extremely weak black dorso-centrals, those in front of the suture rarely outstanding, the posterior presutural pair very rarely moderately strong; one strong supra-alar and a much weaker prealar; anterior notopleural long, the posterior one weak, no humerals. One pair of strong marginal scutellars and a very weak, cruciate apical pair.

Femora yellow haired beneath, the anterior pair with three long bristles on basal half of under surface, the basal one yellow. Posterior tibiae with only one postero-dorsal bristle.

Wings cinereous hyaline, the veins brown, luteous at the base, the first vein bare. Squamae yellowish.

Abdomen shining, the first segment gray pollinose, the hair black, yellow on the basal two segments, sides and venter.

Holotype—♂, Banff, Alta., June 1, 1922, (C. B. D. Garrett), No. 2616 in the Canadian National Collection, Ottawa.

Allotype—♀, Banff, May 29, 1922.

Paratypes—♂, ♀, May 29, 5 ♂, 3 ♀, June 1 and 1 ♀, June 9, 1922, all from Banff, Alta., (Garrett).

Allomyella Malloch

1. Tibiae yellowish or reddish 2.
Tibiae mostly brown 3.
2. Palpi wholly deep black *robusta* n. sp.
Palpi reddish on apical half *brevipennis* Mall.
3. Lower half of face and anterior part of cheeks yellowish .. *unguiculata* Mall.
Face and cheeks wholly blackish *borealis* n. sp.

Allomyella robusta n. sp.

Black, the face, cheeks anteriorly, anterior half of frontal vitta, halteres, tibiae and tarsi, reddish. Length 5.5 mm.

Male. Lower half of head, and narrow posterior and frontal orbits except above, grayish white pollinose, the occiput elsewhere rather yellowish brown, the parafrontals shining black, the vertex and ocellar triangle brownish yellow pollinose. Occiput bristled above, pale yellowish pilose on lower half; cheeks one-fourth eye-height. Palpi dark brown, with yellow hairs laterally and several very short black bristles apically. Antennae deep black.

Thorax moderately gray pollinose, with scarcely a trace of vitta, a brown spot on the mesopleura. Hair of dorsum black, of the pleura white, of sternum, yellow. Acrostical hairs in four rows; dorsocentrals 2-3; no intra-alars, prealar long; no propleural. Scutellum with four strong bristles.

Coxae and femora gray pollinose, yellow haired, the bristles black, the apices of the femora reddish. Tibiae black haired, with white hair on the sides, the tibiae and tarsi with weak silvery reflections in some lights. Middle tibiae with one antero and postero-dorsal bristle, the posterior pair with two antero and postero-dorsals.

Wings with slight brownish and luteous tinge, the veins deep brown. Squamae pale yellow. Halteres reddish, the stem partly yellow.

Abdomen rather thickly pollinose, the sides and segmental apices less thickly so, the short hair wholly pale yellowish, quite abundant, each segment with two or three weak marginal bristles towards either side.

Holotype—♂, Banff, Alta., July 1, 1922 (C. B. D. Garrett), No. 2618 in the Canadian National Collection, Ottawa.

Allomyella borealis n. sp.

Black, a transverse spot immediately above the antennae and the bases of the anterior four tibiae, reddish. Length 5 mm.

Female. Face, cheeks, lower half of occiput and parafrontals anteriorly, gray pollinose, the head elsewhere, except on the red spot, brownish. Pile orange, the occiput with bristles above the neck. Proboscis shining black. Palpi orange,

black at the base, with yellow hair. Antennae black, thinly grayish pollinose.

Thorax with grayish brown pollen which has a grayish tinge ventrally; two narrow, obscure darker vittae. Two or three pairs of presutural acrostical hairs, dorsocentrals 2-3; two intra-alars; prealar not half as long as following bristle. Hair of dorsum black, of the pleura, yellow.

Legs with grayish brown pollen, the coxae and femora yellow haired, tibiae and tarsi black haired; basal fifth of anterior four tibiae reddish. Middle tibiae with one dorsal, antero and postero-dorsal bristle, hind tibiae with two antero and one postero-dorsal bristles.

Wings with brown tinge, the veins deep brown. Squamae luteous. Halteres brownish red.

Abdomen densely brown pollinose, the sides of all but the first two segments except their apices, and a large, dorsal triangle on the sixth, polished black, the sternites with broad black fasciae basally. Hair yellow; some weak marginals on the terminal segments.

Holotype—♀, Cape Prince of Wales, Alaska, June 27, 1926 (D. Jenness), No. 2619 in the Canadian National Collection, Ottawa.

A NEW HEPTAGENIA FROM THE YELLOWSTONE REGION (EPHEMEROPTERA).*

BY J. MCDUNNOUGH,

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Heptagenia criddlei n. sp.

♂ Head dark olive-brown, tinged with paler ochreous around the base of the antennae and behind the ocelli; thorax deep black-brown, the pleural sutures marked with ochreous; abdomen dorsally light clay-color with deep brown semi-rectangular lateral patches, extending forward and downward from the posterior margin of each segment but not attaining the anterior margin except on segments one and two where they occupy nearly the entire segment; ventrally similar in color to dorsum with lateral longitudinal brown streaks or bands adjoining the suture; forceps and setae dull smoky. Forelegs very deep purple-brown, somewhat paler at the base, the tibia slightly longer than the femur, the tarsus subequal to the tibia, the individual joints being short and the first joint about one-third the length of the second which is subequal with the third and fourth; mid and hind legs somewhat paler than forelegs. Wings hyaline with light brown venation, the crossveins being fine and not at all thickened and the costal ones between the basal spur and the bulla being very thin and few in number. Genitalia of the *solitaria* type. Length of body 7 mm., of forewing 7 mm.

Holotype—♂, Yellowstone Nat. Park, Wyo., Aug. 30, (N. Criddle); No. 2232 in the Canadian National Collection, Ottawa.

Paratypes—Eleven ♂, same data.

Distinguished from its allies by the short ♂ foretarsi and the fine crossveins in the costal region of primaries as well as by the abdominal pattern and general deep brown color. I have a series of both sexes of this species from the vicinity of Casper, Wyoming and a number of females from Sundre, Alberta (Aug. 10) which I also incline to place here. The ♀ sex is considerably lighter in color and the abdominal maculation apparently not so well developed.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

NOTES ON THE PHLEPSIDS OF THE SUBGENUS PHLEPSIUS
(RHYNCHOTA HOMOPTERA).BY E. D. BALL,
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Osborne and Lathrop have recently given us a very valuable revision of the North American forms of the genus *Phlepsius*. Their keys and illustrations should make it possible for those interested to make accurate determinations in what has been a very difficult group. The writer in working his material over with the help of this revision found few cases where changes appear to be necessary and most of these were apparently due to the limitations of the material at that time available.

The subgenus *Phlepsius* is still large and unwieldy and should no doubt be broken up into several subgenera when the relationships and distribution of the various groups are better known. *Phlepsius intricatus*, the type of this subgenus, is an European form with simple and uniformly reticulate elytra and a round head. There is a group of species with banded elytra that have been included in this subgenus. This group seems to be entirely American and strikingly distinct in character and is here set off as a subgenus.

Subgenus **Pendarus** subgen. nov.

Resembling *Paraphlepsius* but with the vertex narrower and more angulate, somewhat approaching *Eutettix* in the character of vertex and the banded pattern of the elytra. Head wider than the pronotum, whole insect inclined to taper posteriorly, vertex very variable, angularly produced, the margin inclined to be foliaceous in the females, blunter in the males, disc of vertex flat or slightly longitudinally furrowed, elytra with the venation and irrorations of *Phlepsius*, elytral pattern and frequently that on pronotum in the form of alternate bands. Type of the subgenus *Phlepsius* (*Pendarus*) *slossoni* Ball.

DeLong has pointed out that there is a distinct group of banded forms that are tree inhabiting, such as *slossoni*, *lippulus*, *strobi* and *palustris*, and it seems to the writer that further study is likely to indicate that the pattern of the elytra is a better basis of division than head form as it has been found to be in *Eutettix*. If this is true *collitus*, *fulvidorsum*, *eburneolus* and their allies, together with *punctiscriptus* and possibly *apertus* may be found to be more closely related to the banded forms.

P. apertinus O. & L.=*apertus* Van D. The writer has studied material from many states, from Maine to British Columbia south to Central California, Colorado and Iowa, and especially from the Rocky Mountain region, and finds no constant character that will separate the eastern and western forms, as Van Duzee has already pointed out. The western forms are often broader, as is usual in leafhoppers, but the Colorado forms show both types of heads with all variations in genitalia. The common form, both East and West, is intermediate in both female and male genitalia between the figures given for the two species by Osborn & Lathrop.

P. franconianus Ball=*P. strobi* Fitch. Osborn recently pointed out that the *Eutettix* that has long been considered as Fitch's *strobi* did not agree with the type at Albany which was a true *Phlepsius*.

The writer spent several days collecting on the Fitch farm near Salem and on June 27, 1924, took a pair of *Phlepsius franconianus* from white pine which

when compared with the type of *strobi* were found to agree in all essential details except that the color had faded.

P. fulviceps Osb. & Lath.=*lippulus* Ball. The writer has had opportunity to collect a long series of *lippulus* in the past two years and finds it, like the other banded forms, very variable in length of head and in depth of color. The variations described under *fulviceps* can be matched in many fresh or slightly immature specimens.

P. tullahomi DeLong=*fastuosus* Ball=*slossoni* var. *fastuosus* Ball. This discovery was quite a surprise to the writer who had never questioned the distinctness of the unique New Mexico and Florida examples from which these species were described. It was only when he discovered that *P. tullahomi* DeL. (described from the male)=*fastuosus* Ball (described from the female) and that this species was distributed from New Mexico to New Hampshire that it occurred to him to compare it with the long series of *slossoni* recently taken in Florida. Both forms have the long and extremely variable head in the female and the much shorter and blunter but still variable head in the male, the only constant difference being in the generally darker color of the northern and western forms in which the maculations of the elytra are especially emphasized. The projection on the female plate is very variable in size and form in both species and variety and is frequently more definitely prolonged and bifid than shown.

P. collinus Osb. & Lath.=*pusillus* Baker. This mistake undoubtedly arose through a combination of at least two errors. First, the types of *pusillus* Baker and *minus* Baker have been placed together in the National Museum collection and the *pusillus* types labeled *minus*, so that no *pusillus* types appear. The writer was at one time led astray by this transposition but in a recent study consulted the locality labels and descriptions and found that both sets of types were included. The *pusillus* types agree with the Baker description and the Maryland localities and with examples the writer collected around Washington and determined as *collinus* by the Osborn and Lathrop description and key. As this species is much broader and shorter than any other eastern form there can be no question about the determination.

P. pusillus of Osb. and Lath. (not Baker)=*fuscipennis* V. D. The writer has some very small examples of *fuscipennis* taken around Washington that fit the figures and descriptions nicely, while neither descriptions nor figures agree with Baker's descriptions or types. The figures and descriptions were not taken from the Baker types but from specimens from Washington, D. C. With this erroneous determination they place *pusillus* next to *fuscipennis* in their list but the real *pusillus* is most closely related to *altus*.

P. cottoni S. & DeL.=*minus* Baker. *P. minus* Baker is omitted entirely from the Osborn and Lathrop revision, probably because it was listed in the Van Duzee Catalog as a synonym of *altus*. In limiting *altus* to the "Western prairies and plains" these authors have excluded this possibility as *minus* was described from Maryland. (It is, however, *pusillus* and not *minus* that resembles *altus* and it was no doubt from a study of the incorrectly labeled *pusillus* types that this reference was originally made.) This leaves *minus* still to be accounted for. The unique male type labeled "Oct. 11, Odenton" (Md.) is of a long, slender, but short headed species, with remarkably distinct divergent male plates. The ground

color is milky white with relatively heavy dark spotting and it agrees in every essential with the males of the long series of *cottoni* the writer has taken the past season in Florida. This extends the distribution of this species from Maryland to North Carolina and Florida. The types of *minus* and *latifrons* were both taken at Odenton, Md., an especially sandy region between Washington and Baltimore. It is interesting to note that both species were taken on a similar area in Florida the past season.

P. similis Lath.=*tennessa* DeLong. (*tennessa* O. & L.). This synonymy was published by Lathrop in his "Leafhoppers of South Carolina" but omitted in the revision. As it was not in the Van Duzee Catalog it should have been included to make the revision complete.

P. micronotatus O. & L. = *lascivius* Ball. A comparison of the descriptions and figures of the two species leaves little to distinguish them. There is a slight difference in the drawings of the male plates but examples of *lascivius* from a single locality frequently show the plates scarcely or quite divergent, depending upon the amount of curvature they exhibit. The authors compare the Mexican *micronotatus* with *turpiculus* and probably did not note the resemblance to *lascivius*. The two black spots on the broadly rounded head and the divergent plates render this a very distinct and easily recognized species. The writer has taken this species in western Nebraska, in and near the Bad Lands of North Dakota; Logan, Utah; western Kansas and eastern Colorado and examined examples from Montana and Arizona, while *micronotatus* was from Mexico. It is apparently widely distributed along the higher plains and both slopes of the Rockies.

P. maculosus Osb. (*maculatus* Osb. preoc.)=*pallidus* Van D. The writer has recently compared the *maculosus* in the collection of C. E. Olsen from Bronxville, New York, Jul. 30-'12 (L. B. Woodruff) with a *pallidus* in his own collection from College Station, Tex. Jul. 12-'04 which he had compared with the type of *pallidus* some years before; these two specimens are practically identical in size and structure but the *maculosus* female is somewhat more heavily marked so that the "faint W" on the elytra is obscured. The pattern of markings is, however, the same. The female segment in both examples is very long and slightly narrowing posteriorly. The median half is elevated as it approaches the margin. The elevated portion carries a pair of black stripes either side of a rather broad median white stripe. This definite marking is unusual and alone would identify the species. Both species were described from females and the male was not known until Dr. M. D. Leonard presented the writer with some leafhoppers taken by Professor J. Speed Rogers at a trap light at Gainesville Fla. July 7, 1927. Among a number of valuable things in this collection were a pair of undoubted *P. pallidus*. The female is practically identical with the Texas example, the male is almost as large and has the most striking genitalia of the group. The end of the abdomen is enlarged to carry the immense valve and plates. The valve is very short, almost four times as wide as long, very obtusely angulate. The plates are broader than the abdomen (both wider and longer than the large female segment) outer margins almost parallel or very slightly narrowing, the inner margin slightly separated half way then obliquely cut out to the acute, widely divergent, upturned apices. They are about twice as large and

twice as divergent as in *minimus* (*cottoni*) or *lascivius*.

The extension of the range of this species from Texas to N.Y. is at first glance startling but no more so then than in the case of *fastuosus* from New Mexico to New Hampshire, and as in the latter case the New England examples are darker than those from the South.

***Phlepsius operculatus* n. sp.**

Resembling *latifrons*, intermediate in size and form between *latifrons* and *minimus*, milky-ground color so heavily irrorate as to be very dark. Length 6.5 mm.

Vertex very short and bluntly rounding in both diameters parallel margined, nearly four times as wide as long. Front very broad at base but not as broad as in *latifrons*, convex in both diameters. Elytra long, straight, venation simple, obscured by the vermiculations.

Color of *latifrons* nearly, ground color pale straw except the elytra, which are milky. The irrorations and vermiculations giving a very dark cast, often relieved on the anterior margin of pronotum and the scutellum; the latter has the usual white triangles. Elytra with two pair of definite commisural spots with an ivory area between and the usual marginal spots.

Genitalia; female segment very long, often twice as long as the preceding, posterior margin divided into two internally rounding lobes that are separated over half way to base and resemble the opercula of a Cicada. Male; valve very short, the plates together broadly spoon shaped, slightly separated throughout, and the opening enlarges along the curve of the bowl but closes at tip.

Holotype female, and *allotype* male, Sanford, Sept. 6, 1926, three pair of *paratypes* taken at Sanford and Daytona, Florida. This very distinct species was taken in very low flat pine woods on the margins of swamps; usually associated with coarse grasses, growing in the deep shade. *P. latifrons* is still larger with an even more sloping head. The sharply angulate female genitalia is quite distinctive and was more accurately figured by Van Duzee. *P. minimus* is smaller and slenderer with a much larger vertex and almost truncate segment, while the male plates are divergent.

P. turpiculus Ball. = *fuscipennis* var. *turpiculus* Ball. The relationship of these two species has long puzzled the writer. *P. turpiculus* was described from examples of the big broad pale form that occurs commonly in meadows throughout the plains and Mississippi Valley region and is quite distinct from the small dark reddish form described as *fuscipennis* that is abundant in the salt marsh areas of the Atlantic Coast from New Jersey to Florida.

In his collecting in Florida the writer has found typical *fuscipennis* abundant in the areas bordering the salt marsh and a little way back into the interior while the true *turpiculus* form is rare or absent. Farther inland the paler form becomes abundant and the other rare or absent. The pale form is the only one found in the Winter and Spring. In Florida the pale forms are not as large as the Western examples of *turpiculus*. In most collections the smaller pale forms have been indiscriminately included under *fuscipennis* while the larger pale ones are placed with *turpiculus*. Either two very closely related forms are still being confused or else they are but variations of a single species. It would simplify matters to consider them varieties until some definite means of separation can be worked out.

THE LEPIDOPTERA OF THE SETON LAKE REGION, BRITISH COLUMBIA.*

BY J. MCDUNNOUGH,

Ottawa, Ont.

(continued from page 246)

Sericosema wilsonensis C. & S. Two males which seem to belong to this species according to genitalia were taken on July 8; the species differs from *juturnaria* in its smaller size, lack of the strong ruddy tinges on the underside and in the position of the dark line on underside of secondaries which in *wilsonensis* is nearer the middle of the wing and more evenly rounded. There is a further specimen in the Canadian National Collection from Salmon Arm, B. C., July 18 (A. A. Dennys). The species does not appear to have been previously recorded from British Columbia.

Caripeta divisata Wlk. One ♂, July 3.

Enypia moillieti Blckmre. Two ♂, June 12, 29 which agree with the holotype in the Canadian National Collection, Ottawa.

Enypia packardata Tayl. One ♀, July 13. I am placing this under *packardata* on account of its whitish coloration; I have no ♀ of *moillieti* and the original description makes no mention of the ♀ being paler than the ♂, so I presume they are similarly colored. Otherwise I can see no difference in maculation between the above mentioned ♂ and this ♀. Breeding will be necessary to determine the correct status of *moillieti*.

Ultracis latipennis Hlst. One ♂, June 10.

Glena nigricaria B. & McD. Several specimens of both sexes were taken, most of them in worn condition, on June 3, 6, 14 and 24. The genitalia agree with a slide made from Arizona material and which served for the figure in my Cleorini revision. The range of the species is considerably extended by this capture; there is also a single ♂ in the Canadian National Collection from Keremeos, British Columbia.

Anavitrinella addendaria Grossb. One ♀ was taken at D'Arcy, Anderson Lake, June 17 which I place here on account of the pale purplish gray coloration and the faint light brown tinges following the t. p. lines. It is much paler than *pampinaria* but with similar maculation.

Anagoga pulveraria Linn. One ♂, June 7.

Campaca perlata Gn. Not uncommon in early June.

Plagodis approximaria Dyar. Three ♂, one ♀, June 3, 4, 7 and July 9. The species varies considerably in the amount of curve in the t. p. line and the distinctness of this line on the secondaries.

Hyperctis trianguliferata Pack. Two ♂, one ♀, June 2, 23 and 28.

Nematocampa limbata Haw. One ♂, June 30. Too pale in color to belong to the var. *orfordensis* C. & S.

Euchlaena mollisaria Hlst. Very common throughout June.

Euchlaena tigrinaria sirenaria Stkr. Almost as common as the preceding species, some of the specimens tending to become suffused with brown as in the typical form.

Euchlaena astylusaria Wlk. One ♀, June 29.

Pero giganteus Grossb. Very common in the latter half of June and early July.

Pero behrensarius Pack. Two ♂, one ♀, June 4, 15, 25.

Pero occidentalis Hlst. One ♂, two ♀, June 2, 14, 26.

Pero morrisonarius Hy. Edw. Two ♂, two ♀, June 6, 23, 30, July 3.

Sabulodes cervinaria Pack. One ♂, June 3. I believe the species is rare in British Columbia.

Sabulodes forficaria Gn. Common throughout June.

LIMACODIDAE

Tortricidia testacea Pack. Five specimens taken at various dates in June, one at D'Arcy, Anderson Lake; these show considerable variation in depth of coloration and may belong to Dyar's *crypta*, based largely on a larval form.

PYRALIDAE

PYRAUSTINAE

Egesta cripalis salutalis Hlst. Common during the latter half of June.

Evergestis funalis Grt. Extremely common during June.

Evergestis subterminalis B. & McD. Two specimens June 1, 25.

Evergestis simulatalis Grt. One ♂, Mt. McLean, July 12.

Loxostege chortalis Grt. Two specimens June 17 at D'Arcy, Anderson Lake.

Titanio subargentalis B. & McD. One ♂, three ♀ were captured on Mt. McLean on July 12 at high levels. The identification is rather tentative but the specimens agree fairly well with the original description. The white scaling is easily rubbed off and poor specimens show almost unicolorous primaries.

Perispasta caeculalis Zell. One ♂, two ♀, May 28, June 15.

Phlyctaenia itysalis Wlk. One ♂ ♀, Mt. McLean, July 12 both of the typical ochreous-brown form; one ♀, Seton Lake, June 29 belonged to the blue-gray form.

Phlyctaenia terrealis Tr. One ♀, July 6.

Pyrausta pertextalis Led. One ♂ ♀, June 25, July 8.

Pyrausta fumoferalis Hlst. Not uncommon all through June and early July.

Pyrausta unifascialis Pack. One ♂, Mt. McLean, July 12.

Pyrausta inaequalis plagalis Haim. I bred a small series of what I take to be *plagalis* from larvae living in a mass of web and excrement at the bases of thistle leaf-stalks and partially boring into the stem. Some of the specimens are extremely handsome with strong ruddy suffusion over the median area of primaries but this is not always strongly marked, especially after the specimen has been some time on the wing.

SCOPARIINAE

Scoparia rectilinea Zell. One specimen, June 29.

Scoparia lugubralis Wlk. Three specimens, June 3, 4, July 13, which seem to belong here.

Scoparia centuriella D. & S. Not uncommon in late June and July.

***Scoparia cervicalis* n. sp.**

♂.—Primaries evenly pale fawn-color with sparse black sprinkling; t. a. line slightly outcurved below costa followed by a smoky band which contains a black streak representing claviform; orbicular absent, reniform dark, x-shaped, more or less filled with dark shading and with a small dark patch on costa above

it; t. p. line dark, shaded outwardly with the ground color, straight below costa, then strongly bent outward opposite reinfoam, forming a sharp angle, then inwardly oblique to vein three and perpendicular from there to inner margin; a dark blotch in subterminal area on costa and a fainter shade above tornus; a narrow dark band along lower half of outer margin; fringes concolorous with faint smoky basal line. Secondaries very pale smoky. Beneath pale smoky, immaculate. Expanse 16 mm.

Holotype—♂, Seton Lake, B. C., June 13 (J. McDunnough); No. 2584 in the Canadian National Collection.

Paratypes—Fifteen ♂, same locality, June 5, 13, 14, 28.

The fawn-colored primaries with sharp angle in t.p. line separate the species from other members of the *basalis* group.

PYRALINAE

Pyralis farinalis Linn. Not uncommon in late June and July.

Herculia florencealis Blkmre. One ♀, July 14.

CHRYSAUGINAE

Arta statalis Grt. One ♂, June 5; there is also a specimen before me from Vernon, B. C., July 5.

CRAMBINAE

Crambus pascuellus Linn. A few specimens both at Seton and at Anderson Lakes in June.

Crambus praeffectellus Zinck. One ♂ ♀, June 8, 30.

Crambus innotatellus Wlk. One ♂, June 4.

Crambus hortuellus Hbn. One ♀, June 30.

Crambus nevadellus Kft. Common throughout June.

Crambus oregonicus Grt. Two specimens, Mt. McLean, July 12.

EPIPASCHIINAE

Tetralopha aplastella Hlst. One ♂, June 2.

As I pointed out in the "Contributions" III, p. 193, there is considerable doubt as to the identity of this species owing to the carelessness and inaccuracy of Hulst in labelling his type specimens. I presume, however, that the best course to follow will be to accept the ♀ in the Hulst Collection labelled "Colorado" as the type of the species and incidentally as the genotype of *Tioga*. Holland's figure therefore in his paper on the Epipaschiinae of the Western Hemisphere (1925 Ann. Carn. Mus., XVI, Pl. V, fig. 22) of an Aweme, Man. ♀ may be taken as representative of the species.

I cannot, however, agree with Holland in using the term *Tioga* Hlst. to replace *Tallula* Hulst; in this he is evidently following Hampson (1896, Trans. Ent. Soc. Lond., p. 455) who, at the time of his revision, was unacquainted with actual specimens of the genotype of *Tioga*. The trouble lies in the fact that Hampson's characterizations of the venation of *Tallula* and *Tetralopha* (or *Pococera* as he calls it) were drawn from males, whereas Hulst's definition of *Tioga* was based on a ♀; owing to the secondary sex characters on the underside of the ♂ primaries in this group the venation of the two sexes is different (vide Hulst, Ent. Amer. V, 49). Hulst, defining *Tioga* (Ent. Amer. IV, 113 and V, 69) states that on forewings vein six is stalked with seven, eight and nine and vein eleven is wanting and that it only differs in the ♀ from *Tetralopha* in the

stalking of vein six. In two ♀ before me from Aweme, Man. which are almost identical with each other and with Holland's figure of *aplastella* I find the following variation in venation—one ♀ agrees absolutely with Hulst's definition, the second one, however, has vein six connate with the stalk of seven, eight and nine and vein eleven weak but present, long stalked with ten and branching off close to costa. In a series of eastern *asperatella* ♀ similar variable conditions prevail, vein six may be either connate or shortly stalked with seven, vein eleven is apparently normally present and long-stalked with ten but is frequently missing. The position, therefore, of veins six and eleven in the ♀ cannot, in these two species, be used for generic separation and as far as my scanty material of other species permits me to judge, females all through the genus *Tetralopha* show a similar variability. It might be further noted that *aplastella* has a very great superficial resemblance to *asperatella*, in fact so much so that I should not be surprised to find the former to be merely a western race of the later; in any case *aplastella* appears quite misplaced among the other North American species of *Tallula*, which I believe to be a good genus, and I see no good reason for altering its position as indicated in the 1917 Check List.

PHYCITINAE

Myelois conicella Rag. Two ♀, June 29, July 5.

Dioryctria ponderosae Dyar. One ♂, July 8. Identified as this species by Mr. C. Heinrich of the United States National Museum.

Dioryctria reniculella Grt. Five ♂, one ♀, June 25, 26, July 13. This small series splits up into two forms, one of which is characterized by smoother appearance of the primaries with distinct clay-colored band before the t. p. line. As, however, Mr. Heinrich claims (in litt.) that this is merely individual, and as I had further no opportunity of checking up on the larval habits I use Grote's name for the entire series; it is probable that Hulst's name *elegantella* will apply to one of these forms but the type will have to be studied before the correct reference can be made.

Pyla rainierella Dyar. What I presume to be this species was extremely common on Mt. McLean on July 12. There is considerable variation in size and in the amount of metallic scaling and it should be noted that there is a great tendency in this group for the coloring of the scales to turn from green to bronze and even to purple-black if the moisture in the relaxing tin is too great. Some of my series correspond quite well with Dyar's diagnosis of *sylphiella* (1921, Ins. Mens. IX, 68) but I am undecided whether there are actually two species represented by these names; a very careful study of the type material will be necessary to decide the question.

Pyla scintillans Grt. One ♂ was taken on Mt. McLean, July 12, which seems to fall here.

Euzophera semifuneralis Wlk. Two specimens, July 1, 4.

Vitula serratilincella Rag. Not uncommon in June and early July.

Ephestiodes gilvescentella Rag. What appears to be this species came quite commonly to light during late June and July. Some of the males show a faint ruddy tinge along the inner margin and the hind wings are slightly tinged with fuscous but hardly sufficiently enough in either case to agree with Dyar's characterization of *benjaminella* from Kaslo material. My series is in general

rather darker than Vancouver Island specimens we have under this name, but I can detect no other differences.

Eurythmia spaldingella Dyar. One worn ♀, June 29, which, as far as I can determine, appears to belong to this species.

Moodna nigrella Hlst. One ♀, June 29, which seems to fit Hulst's original description pretty well. It might be noted that this specimen has veins three and five of secondaries on a much longer stalk than is found in other species of the genus but in other respects seems to be a typical *Moodna*.

***Moodna setonella* n. sp.**

Primaries light gray, heavily sprinkled with black, especially in the lower median area; inner line pale, even, outwardly oblique, bordered outwardly by a much more prominent dark line; two distinct black discal dots; outer line more or less parallel to outer margin, pale, very finely dentate, bordered on both sides by dark shades; median area with costal portion as far as the discal dots distinctly paler than remainder, the two areas being rather sharply defined by an oblique shade extending from lower discal dot to inception of outer line; fringes pale smoky. Secondaries hyaline, tinged with smoky especially along veins; fringes light smoky at base, paler outwardly. Expanse 16 mm.

Holotype—♀, Seton Lake, B. C., June 28 (J. McDunnough); No. 2586 in the Canadian National Collection.

Allotype—♂, same locality, June 29.

Paratypes—Three ♀, same locality, June 28, July 4.

On account of the better condition of the specimen I have made the ♀ the holotype; the ♂ seems in general rather paler in color. In venation the species is a typical *Moodna* and differs from all other species in this genus by the oblique inner line and pale color of primaries.

Ephestia clutella Hbn. One ♂, June 28.

PTEROPHORIDAE

Most of the species of this family taken at Seton Lake have already been fully treated of in my paper on Canadian Plume Moths which appeared in the Transactions of the Royal Society of Canada, 1927, pp. 175-188. I, therefore, confine myself here to a more list of the species.

Pterophorus delawarensis Zell. One ♂, D'Arcy, Anderson Lake, June 17.

Platyptilia ardua McD. Two ♂, two ♀, from Mt. McLean, July 12, at 6000 ft. served as the type specimens of this new species.

Platyptilia edwardsi Fish. Not uncommon on Mt. McLean on July 12 at 6000 ft.

Platyptilia fragilis Wlshm. Beaten from sage-brush in July. Miss A. Braun has recently (1925, Trans. Am. Ent. Soc. LI. 184) recorded the larva as feeding in the seeds of *Pentstemon cyananthus*.

Platyptilia albiciliata canadensis McD. One ♂, Marble Canyon, near Lillooet, May 26 and one ♀, Seton Lake, June 3, served as Holotype and Allotype of this racial form.

Stenoptilia columbia McD. One ♂, Seton Lake, June 3, was made the Holotype of this species.

Oidaematophorus guttatus Wlshm. One ♀, July 5.

Oidaematophorus grisescens Wlshm. A long series was bred from larvae beaten in early June on sage-brush.

Oidaematophorus fishi Fern. One ♀, taken on Mt. McLean at about 4500 ft. on July 12.

Oidaematophorus corvus B. & L. One ♀, Mt. McLean, July 11, at about 6000 ft.

GELECHIIDAE

Metzneria lappella Linn. One ♂, June 7.

Several other species in this family were captured but cannot be identified at the present time.

OECOPHORIDAE

Eumeyrickia trimaculella Fitch. One ♀, June 15.

***Depressaria artemisiella* n. sp.**

♂.—Antennae dark brown, paler beneath; palpi ochreous, the base of second joint deep brown and the well developed brush with numerous brown scales mingled with ochreous, third joint with faint trace of brown ring at base; head ochreous mixed with brownish and with anterior margin of front deep brown; thorax largely deep purple-brown mixed sparsely with ochreous; abdomen ochreous. Primaries light wood-brown, shaded with deep brown on costal half at base and streaked as usual with white and black; subcostal vein black, sprinkled with white on outer half; radial veins black, cut by a very oblique white line of scales which angles backward near apex of cell; discal dot *b* small, black, joined by a heavy white streak to the white discal dot *d* which is obscure; cubital vein largely white in its mid-section, shaded above and below with deep brown; veins three and four slightly sprinkled with white scales, five almost entirely black; a short black streak above inner margin beyond base of wing; a broad black, slightly broken terminal line; fringes concolorous, with slight pinkish tinge. Secondaries very pale smoky, deeper outwardly with faint darker terminal line and concolorous fringes. Beneath shiny pale smoky ochreous with broken black terminal line on both wings. Expanse 22 mm.

Holotype—♂, Seton Lake, B. C., July 6, (J. McDunnough); No. 2655 in the Canadian National Collection.

Paratypes—Two ♂, same data.

All three specimens were reared from pale green larvae feeding on sage-brush. I am indebted to Mr. A. Busck for the information that the species is new and allied to *barberella* Bsk.

Borkhausenia haydenella Cham. One ♂, June 9.

Decantha borkhauseni Zell. One specimen, June 9. Kindly determined by Mr. A. Busck.

ETHMIIDAE

Ethmia marmorea Wlshm. One ♂, July 2. I think this is a new record for Canada.

Pyramidobela quinquecostata Braun. Two specimens, June 20, 28, which agree excellently with a Paratype deposited by Miss Braun in the Canadian National Collection. This record is a new one for Canada.

AEGERIIDAE

Synanthedon rutilans Hy. Edw. One ♀, June 29.

Memythrus pyramidalis Wlk. One ♀, Mt. McLean, July 12.

Paranthrene perlucida Bsk. One ♀, June 30, taken on the Fraser River flats, kindly determined as this species by Mr. G. P. Engelhardt.

EUCOSMIDAE

Episimus argutanus Clem. Several specimens beaten out of Sumac bushes in late May and early June.

Badebeckia urticae Hbn. Taken both at Seton Lake and at Anderson Lake in late May and early June.

Exartema quadrifidum Zell. Not uncommon in June.

Exartema appendiceum Zell. Two ♂, one ♀, Anderson Lake, June 17.

Hedia ochroleucana Hbn. Fairly common during the latter part of June.

Argyroploce albiciliana Fern. One ♂, Anderson Lake, July 17.

Argyroploce glaciana Moesch. One ♀, Anderson Lake, July 17.

***Thiodia altana* n. sp.**

At Alta Lake on June 10 and 11 I captured four specimens of a *Thiodia* which is very close to dark specimens of the European *aspidiscana* Hbn., Walsingham's record from The Dalles, Oregon of this species being possibly based on a similar specimen. In the ♂ genitalia, as examined *in situ*, the heart-shaped space formed between the curving claspers is the same size as in *aspidiscana* and much narrower than in *formosana* Clem. which the species also resembles, the ♂ of the present species being similar in general appearance to the ♀ of *formosana*; however, the excavation of the ventral posterior margin of the last abdominal segment is deeper and narrower in the three ♂ before me than in *aspidiscana* and as further the maculation does not entirely agree with that of the European species I am treating the species as new.

♂—Basal two-thirds of primaries deep black-brown with slight purplish reflections and sparse sprinkling of ochreous scaling; outer one-third largely light olive-brown, the ocelloid patch outlined incompletely with silver scaling and containing three rather broken transverse lines, the costa with four pairs of white spots, separated by darker brown shades and giving rise to oblique silvery streaks which are more or less coalescent, the streak from the first pair forming the outer margin of the dark area, that from the second pair proceeding obliquely to outer margin above middle where it joins a vertical streak from the apex; fringes smoky with a slight pale admixture, the basal portion deepest in color. Secondaries deep smoky with a whitish streak along costa, fringes pale with a dark basal line.

♀.—Basal area paler than in ♂ with traces of a dark streak through the fold, a dark patch before the middle of inner margin and a decided dark band limiting this area outwardly; outer area much as in ♂. Expanse 17-18 mm.

Holotype—♂, Alta Lake, B. C., June 11 (J. McDunnough); No. 2589 in the Canadian National Collection.

Allotype—♀, same locality, June 10.

Paratypes—Two ♂, same data.

The species is considerably larger than *corculana* Zell. and has not the distinctly pale ocelloid patch of this species.

Thiodia transversa Wlsh. One ♀, Mt. McLean, July 12. I place this tentatively under this name as the specimen agrees closely with a ♀ from Color-

ado in our National Collection: a ♂ will be necessary to settle the determination definitely.

Thiodia influana Heinr. One ♀, June 2.

Thiodia youngi McD. One ♀, July 1, beaten out of an *Artemisia* bush which possibly is the larval food-plant.

Thiodia pallidarcis Heinr. This species was very common around sage-brush (*Artemisia tridentata*) in late June and early July; my specimens are rather paler than typical San Diego ones but the ♂ genitalia agree with Heinrich's figure. I believe the record is a new one for Canada.

***Thiodia setonana* n. sp.**

Head and palpi white, the latter slightly fringed with smoky outwardly. Thorax and primaries white or greyish white; basal third of wing, with the exception of the extreme base and costal edge bright red-brown, the outer edge of this patch being strongly outwardly oblique from costa at one-fourth to below cell and then more or less perpendicular to inner margin; a red-brown postmedian band, subparallel to outer edge of basal patch and generally tapering or obsolescent above inner margin; a small red-brown apical patch, preceded by slight, similarly colored dashes and streaks on and below costa, these at times being more or less obsolete; ocelloid patch frequently slightly grayer than the remainder of wing, defined by three upright, slightly raised silvery bars, between which is a variable number of black dots, ranging from two to nine, generally most constant between the outer pair of bars, where they are arranged in three transverse rows; some irregular faint silvery streaks in the apical area, partially defining the red-brown areas; fringe white, slightly peppered in the basal half with black. Secondaries pale smoky; fringes white with a dark line at base. Beneath primaries smoky with a white costa, secondaries whitish. Expanse 16 mm.

Holotype—♂, Seton Lake, B. C., June 2 (J. McDunnough); No. 2587 in the Canadian National Collection.

Allotype—♀, same data.

Paratypes—Five ♂, two ♀, same locality, June 2, 5, 7, 14, 15, July 1.

This species is evidently closely allied to *octopunctana* Wlshm, but the ♂ genitalia agree in the shape of the cucullus with Heinrich's figure of *scalana* Wlshm. There is considerable variation in the red-brown markings of the apical area and one ♀ shows a fine curved red-brown line branching from the postmedian band and defining the ocelloid patch. The specimens were all taken by beating sage-brush (*Artemisia*) which is evidently the food-plant of the larva, but they were distinctly rare and the series was only obtained after considerable effort.

Eucosma argentialbana Wlshm. Odd specimens were taken throughout my entire stay, seven in all being captured; these all belong to the form mentioned by Heinrich as having the white pattern more outstanding than usual and superficially resembling *serpentana*: as this seems to be the normal form in central British Columbia as compared with the more unicolorous Manitoba form I believe I am justified in proposing for it the varietal name *BRITANA*.

Holotype—♂, Seton Lake, B. C., June 20 (J. McDunnough) No. 2588 in the Canadian National Collection.

Paratypes—Six ♂, same locality, May 29, 31, June 3, 15, 30, July 3.

Eucosma pergandeana Fern. Six specimens were taken in late May and early June which I cannot separate from eastern specimens of this species; the color is certainly not that of *flavana* so that this name can scarcely apply to all western forms; some of my series look rather like small *agricolana* but I have never been able to satisfactorily distinguish this species.

Eucosma watertonana McD. A series of six specimens taken singly between May 30 and July 1. One ♀ shows traces of dark sprinkling over the primaries as in *scrupicana* Heinr. and is almost as pale in color as this species; more Montana material of this latter species is needed, to determine its range of variation, before the status of the two names can be settled.

Eucosma dodana Kft. One ♀, Mt. McLean, July 12.

Eucosma biplagata Wlshm. One ♂, July 3; a new record for Canada, I believe.

Epiblema periculosana Heinr. One ♂, Anderson Lake, June 17.

Proteoteras arizonae Kft. One ♂, rather worn, May 28, which seems to belong here according to Heinrich's key. The record is a new one for Canada.

Epinotia castaneana Wlshm. One ♀, June 7.

Epinotia rectiplicana Wlshm. One ♀, Anderson Lake, June 17.

Epinotia cruciana Hbn. One ♀, July 3.

Anchylopera lamiana Clem. Two ♂, May 27, 30. This is the *discigerana* of Heinrich and other authors, but, according to a specimen compared for me with Walker's type by Mr. W. H. Tams, the true *discigerana* is the species we know as *spireaefoliana* Clem. In place of this name, therefore, I use *lamiana*, placed doubtfully by Heinrich as a synonym; Clemens original description seems to fit and the species occurs in the east as there is a specimen from St. John, Newfoundland in the Canadian National Collection.

Hystriophora stygiana Dyar. Rather small specimens were common on Mt. McLean at about 6000 ft. on July 11 and 12.

Dichrorampha britana Bsk. Two ♂, one ♀, May 28, 29.

Dichrorampha kana Bsk. Several specimens, Mt. McLean, July 12.

Laspeyresia populana Bsk. One ♀, July 3.

TORTRICIDAE

Cacoecia rosaceana Harris. Not uncommon. The species occurred in two forms, a very dark red-brown form and a pale ochreous one but apart from color I can see no difference in the two series.

Cacoecia conflictana Wlk. Common at light in early July.

Tortrix glaucana Wlshm. One ♀, June 30.

Harmologa fumiferana Clem. Common on the lower slopes of Mt. McLean in early July.

Cnephasia osseana Scop. Common on Mt. McLean at 6000 ft. on July 12.

PHALONIIDAE

Phalonia deutschiana Zett. Common and very variable on Mt. McLean on July 12 at about 6000 ft.

GLYPHIPTERYGIDAE

Choreutis balsamorrhizella Bsk. Two specimens, Anderson Lake, June 17, sitting on the food-plant.

Choreutis pernivalis Braun. I took a nice series of this species on May 26 in the Marble Canyon, near Pavilion, on the road from Ashcroft to Lillooet and about twenty miles north-east of this latter locality. The record is new for Canada.

PLUTELLIDAE

Euceratia castella Wlshm. Common in late May and early June.

Harpipteryx canariella Wlshm. One ♂, July 2.

Plutella maculipennis Curt. Probably quite common, but I only took one specimen on June 13.

GRACILARIIDAE

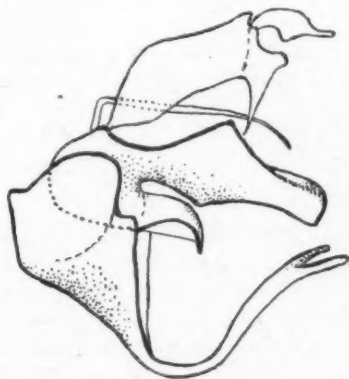
Gracilaria alnivorella var. *ruptistrigella* Beut. One specimen, June 20. Determined by Mr. A. Busck.

Acrocercops sp. near *strigifinitella* Clem. One specimen, June 9. Determined by Mr. A. Busck.

SCYTHRIDIDAE

***Scythris pacifica* n. sp.**

♂.—Labial palpi deep smoky, long, porrect or slightly upturned, third joint almost equal in length to second one; antennae finely ciliate without pecten on basal joint, deep smoky. Head, body and wings unicolorous deep smoky, latter somewhat shiny and hardly as deep blackish as in *eboracensis* Zell.



♀.—Rather paler in color than the ♂, but otherwise similar. Expanse 12-14 mm.

Holotype—♂, Seton Lake, B. C., June 15 (J. McDunnough); No. 2657 in the Canadian National Collection.

Allotype—♀, same locality, May 28.

Paratypes—Three ♂, same locality, May 27, 28, June 4; two ♂, Waterton Lakes, Alta., July 12, 20 (J. McDunnough).

Mr. Busck, who has recently made an exhaustive study of the ♂ genitalia of the species of *Scythris*, writes me that as far as he can tell, the above species has not been heretofore described. I venture, therefore, to do so now and give the accompanying figure of the ♂ genitalia which appear quite characteristic as compared with *eboracensis* and a few other Canadian species before me.

Memythrus pyramidalis Wlk. One ♀, Mt. McLean, July 12.

Paranthrene perlucida Bsk. One ♀, June 30, taken on the Fraser River flats, kindly determined as this species by Mr. G. P. Engelhardt.

EUCOSMIDAE

Episimus argutatus Clem. Several specimens beaten out of Sumac bushes in late May and early June.

Badebeckia urticana Hbn. Taken both at Seton Lake and at Anderson Lake in late May and early June.

Exartema quadrifidum Zell. Not uncommon in June.

Exartema appendiceum Zell. Two ♂, one ♀, Anderson Lake, June 17.

Hedia ochroleucana Hbn. Fairly common during the latter part of June.

Argyroploce albiciliana Fern. One ♂, Anderson Lake, July 17.

Argyroploce glaciana Moesch. One ♀, Anderson Lake, July 17.

Thiodia altana n. sp.

At Alta Lake on June 10 and 11 I captured four specimens of a *Thiodia* which is very close to dark specimens of the European *aspidiscana* Hbn., Walsingham's record from The Dalles, Oregon of this species being possibly based on a similar specimen. In the ♂ genitalia, as examined *in situ*, the heart-shaped space formed between the curving claspers is the same size as in *aspidiscana* and much narrower than in *formosana* Clem. which the species also resembles, the ♂ of the present species being similar in general appearance to the ♀ of *formosana*; however, the excavation of the ventral posterior margin of the last abdominal segment is deeper and narrower in the three ♂ before me than in *aspidiscana* and as further the maculation does not entirely agree with that of the European species I am treating the species as new.

♂—Basal two-thirds of primaries deep black-brown with slight purplish reflections and sparse sprinkling of ochreous scaling; outer one-third largely light olive-brown, the ocelloid patch outlined incompletely with silver scaling and containing three rather broken transverse lines, the costa with four pairs of white spots, separated by darker brown shades and giving rise to oblique silvery streaks which are more or less coalescent, the streak from the first pair forming the outer margin of the dark area, that from the second pair proceeding obliquely to outer margin above middle where it joins a vertical streak from the apex; fringes smoky with a slight pale admixture, the basal portion deepest in color. Secondaries deep smoky with a whitish streak along costa, fringes pale with a dark basal line.

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Eucosma argentibana Wlshm. Odd specimens were taken throughout my entire stay, seven in all being captured; these all belong to the form mentioned by Heinrich as having the white pattern more outstanding than usual and superficially resembling *serpentana*: as this seems to be the normal form in central British Columbia as compared with the more unicolorous Manitoba form I believe I am justified in proposing for it the varietal name *BRITANA*.

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PHALONIIDAE

Phalonia deutschiana Zett. Common and very variable on Mt. McLean on July 12 at about 6000 ft.

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Choreutis balsamorrhizella Bsk. Two specimens, Anderson Lake, June 17, sitting on the food-plant.

Choreutis pernivalis Braun. I took a nice series of this species on May 26 in the Marble Canyon, near Pavilion, on the road from Ashcroft to Lillooet and about twenty miles north-east of this latter locality. The record is new for Canada.

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Harpipteryx canariella Wlshm. One ♂, July 2.

Plutella maculipennis Curt. Probably quite common, but I only took one specimen on June 13.

GRACILARIIDAE

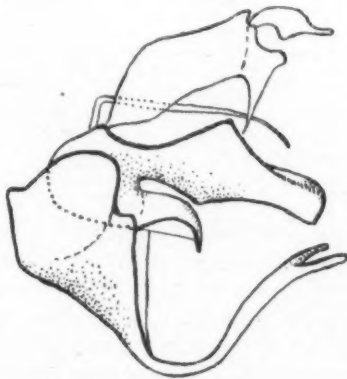
Gracilaria alnivorella var. *ruptistrigella* Beut. One specimen, June 20. Determined by Mr. A. Busck.

Acrocercops sp. near *strigifinitella* Clem. One specimen, June 9. Determined by Mr. A. Busck.

SCYTHRIDIDAE

***Scythris pacifica* n. sp.**

♂.—Labial palpi deep smoky, long, porrect or slightly upturned, third joint almost equal in length to second one; antennae finely ciliate without pecten on basal joint, deep smoky. Head, body and wings unicolorous deep smoky, latter somewhat shiny and hardly as deep blackish as in *eboracensis* Zell.



♀.—Rather paler in color than the ♂, but otherwise similar. Expanse 12-14 mm.

Holotype—♂, Seton Lake, B. C., June 15 (J. McDunnough); No. 2657 in the Canadian National Collection.

Allotype—♀, same locality, May 28.

Paratypes—Three ♂, same locality, May 27, 28, June 4; two ♂, Waterton Lakes, Alta., July 12, 20 (J. McDunnough).

Mr. Busck, who has recently made an exhaustive study of the ♂ genitalia of the species of *Scythris*, writes me that as far as he can tell, the above species has not been heretofore described. I venture, therefore, to do so now and give the accompanying figure of the ♂ genitalia which appear quite characteristic as compared with *eboracensis* and a few other Canadian species before me.

LYONETIIDAE

Bucculatrix angustisquamella Braun. This species was very common around sage-brush on May 30.

Bucculatrix chrysothamni Braun. One specimen, June 13.

Bucculatrix pomifoliella Clem. One specimen, June 6.

The above three species were kindly determined for me by Miss A. Braun.

TINEIDAE

Amydria coloradella Dietz. One ♂, June 29; one ♂, Anderson Lake, June 17. Determination by Mr. A. Busck.

COSSIDAE

Acosus populi orc Stkr. Common during the latter half of June and July, the larva evidently breeding in the numerous cotton-woods along Seton Lake Creek. The specimens show considerable variation in the density of the black reticulations of the forewing, some males being quite close to the figure of the type of *orc* given in our revision and others hardly to be distinguished from Calgary specimens which I have considered to be more or less typical.

Prionoxystus robiniae Peck. Not uncommon along with the preceding species. The larva also breed in cotton-woods, as I captured a ♀ on the trunk of a cotton-wood just emerged from the pupa which was protruding from the tree.

INCURVARIIDAE

Setonella gen. nov.

Labial palpi very long, porrect and rough-haired, extending far beyond the head; maxillary palpi well-developed, bent, the portion following the bend fully two-thirds the width of the front between the eyes; tongue rudimentary; head very rough-haired. Primaries with all veins present and generally separate, or seven and eight occasionally short-stalked or connate; secondaries with normal venation. Genotype. *S. buscki* n. sp.

Setonella buscki n. sp.

♂.—Labial palpi dull brown, antennae white, ringed with brown, tuft of head ochreous brown; thorax and primaries darker brown with a faint purplish tinge and a very slight sprinkling of paler scaling; traces of a pale spot on middle of inner margin; fringes dark. Secondaries deep smoky with slightly paler fringes. Beneath almost unicolorous deep smoky brown. Expanse 17-21 mm.

Holotype—♂, Seton Lake, B. C., May 28 (J. McDunnough) No. 2656 in the Canadian National Collection.

Paratypes—Three ♂, same locality, May 28, June 6.

I take pleasure in naming this interesting species after Mr. A. Busck whose assistance in the determination of some of the obscurer species of my collection has been of the utmost value.

ADELIDAE

Adela septentrionalis Wlshm. Three ♂, two ♀, May 27.

SUPPLEMENTARY NOTE

Since the first portion of my article, dealing with the diurnals, has appeared, I have had, through the kindness of Mr. E. H. Blackmore, the opportunity of examining *Euphydryas* specimens from Chilcotin, B. C. which are probably some of the same lot which passed through Mr. Gunder's hands when he de-

scribed the aberration, *E. perdiccas* ab. *nigrisupernipennis*. An examination of the genitalia of these specimens shows that they belong to *anicia* and not to *perdiccas* and the name *nigrisupernipennis* cannot be employed for the altitude form of *perdiccas* mentioned by me on page 159 of my article; for the present, at least, the name *paradoxa* McD., proposed for the lower altitude form, may be employed as the differences between the two forms is very slight and largely one of size.

A NEW CLEORID WITH NOTES ON SYNONYMY (GEOMETRIDAE, LEPID.).*

BY J. MCDUNNOUGH,
Ottawa, Ont.

Among some Arizona and Texas material received through Mr. S. Cassino I have found a species of *Parapheromia* which appears to be new and which I describe as follows:—

Parapheromia cassinoi n. sp.

Male. Antennae claviform; head and thorax an admixture of black and light gray scaling; primaries light brown, heavily obscured with black scaling the ground-color only showing plainly along the outer margin and in the median area in the region of the discal spot; lines black, the basal one double and strongly excurved, the median one arising from a small black costal patch and subparallel to basal line, outer one irregularly outcurved below costa, then inwardly oblique and rather rigid to a point below the inception of vein two, where it bends and runs perpendicular to inner margin; this line distinctly geminate in its lower region and followed above inner margin by an irregular white patch; s. t. line white, irregularly dentate and preceded by a blackish shade; a slight black dash below apex and faint black terminal line; fringes pale smoky. Secondaries pale smoky with a rigidly oblique black antemedian line, a sinuate, black postmedian line, strongly bent inwards at vein two and preceded by a small but distinct black discal dot (at times partially white-filled); s. t. shade dark, somewhat irregular and bordered on each side faintly with whitish; terminal area somewhat brownish with black scalloped terminal line. Expanse 25 mm.

Female. More heavily black-shaded than the male.

Holotype—♂, Paradise, Ariz., Aug. 1925 (O. C. Duffner); No. 2598 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, in Coll. Cassino.

Paratypes—1 ♂, same data; 3 ♂, McNary, Ariz., Aug.; 1 ♂, Alpine, Tex., May 15-30; 8 ♂, 2 ♀, S. Texas, Oct. 1-15; 3 ♂, 4 ♀, Jemez Spgs, N. M. July 20, 30, Aug. 4, 17, 19, 25, in Canadian National Collection and Collection Cassino.

The male genitalia are very similar to those of *lichenaria* and *configurata*, differing only in minor details of the spining of the pads on the claspers. The species is at once distinguished by the white tornal patch.

Stenoporpia separataria Grt.

Cymatophora separataria Grote, 1883, Can. Ent. XV, 124; McDunnough, 1920, Bull. 18, Ent. Br. Dept. Agr., Ottawa, 10.

Stenoporpia umbraria McDunnough, 1925, Can. Ent. LVII, 11.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Judging by a photograph of the type of *separataria*, taken by Mr. Jeane Gunder and received through the kindness of Mr. F. H. Benjamin the above synonymy will hold.

***Stenoporpia pulchella* Grossb.**

Scldosema pulchella Grossbeck, 1909, Can. Ent. XLI, 156.

Stenoporpia pulchella McDunnough, 1920, Bull. 18, Ent. Br. Dept. Agri., Ottawa, 26.

Stenoporpia coolidgearia Dyar, 1923, Insec. Ins. Menst. XI, 24.

A photograph of Dyar's type, received from the same source as above makes this synonymy fairly obvious.

BOOK NOTICE

Histological Technique. By B. F. Kingsbury and O. A. Johannsen. Published by John Wiley & Sons, New York, 1927. Pp. 142. Price \$2.25.

This very useful volume, compiled by two Cornell professors, represents a combination of technique notes by the first author for use in connection with histological courses for medical and veterinary students and a similar outline by the second author for use in courses dealing with the histology of insects. Full details are given of the ordinary methods of fixation, sectioning, staining and mounting and in addition there are two chapters dealing with special methods for various animal forms and for certain tissues and organs. A number of references to more elaborate works on the subject complete the book.

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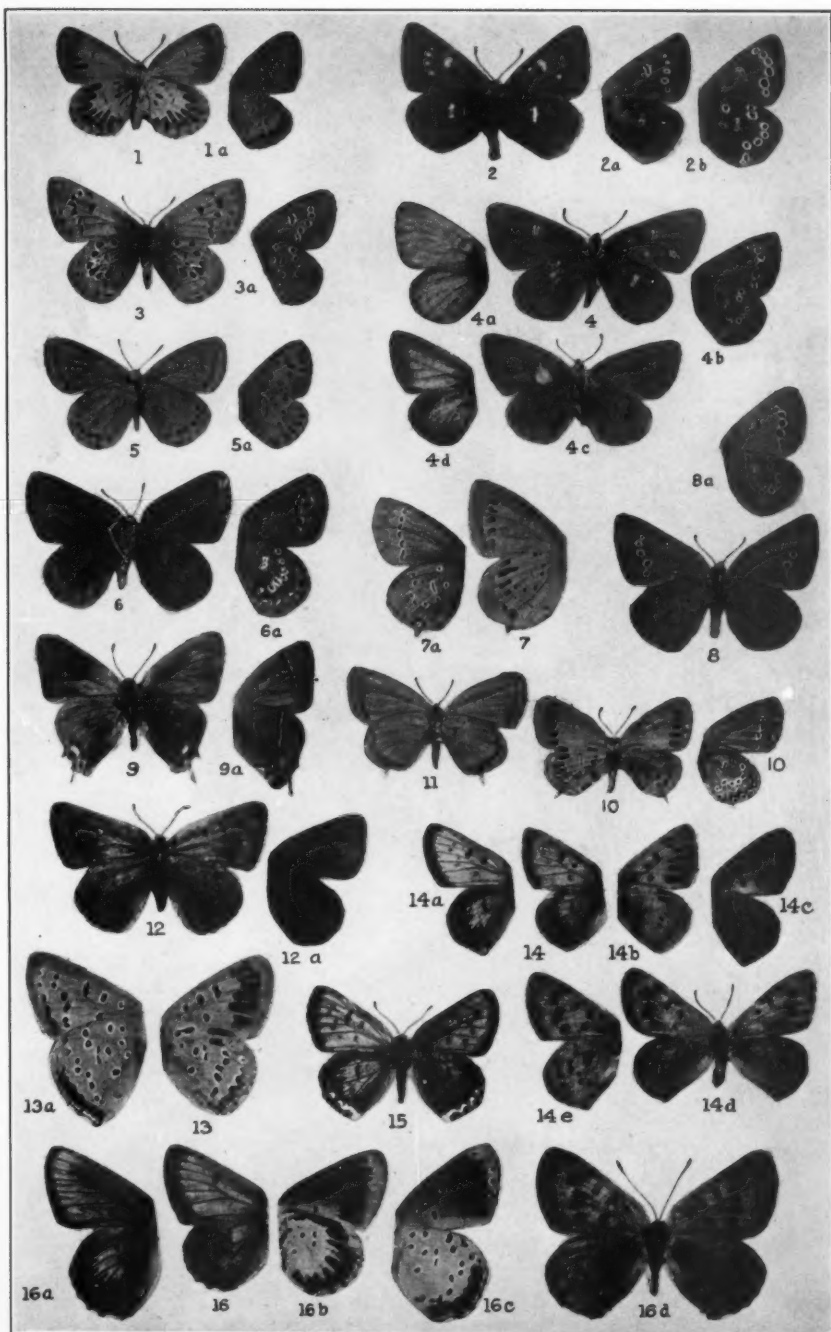
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NEW TRANSITION FORMS—GUNDER.

PLATE A.

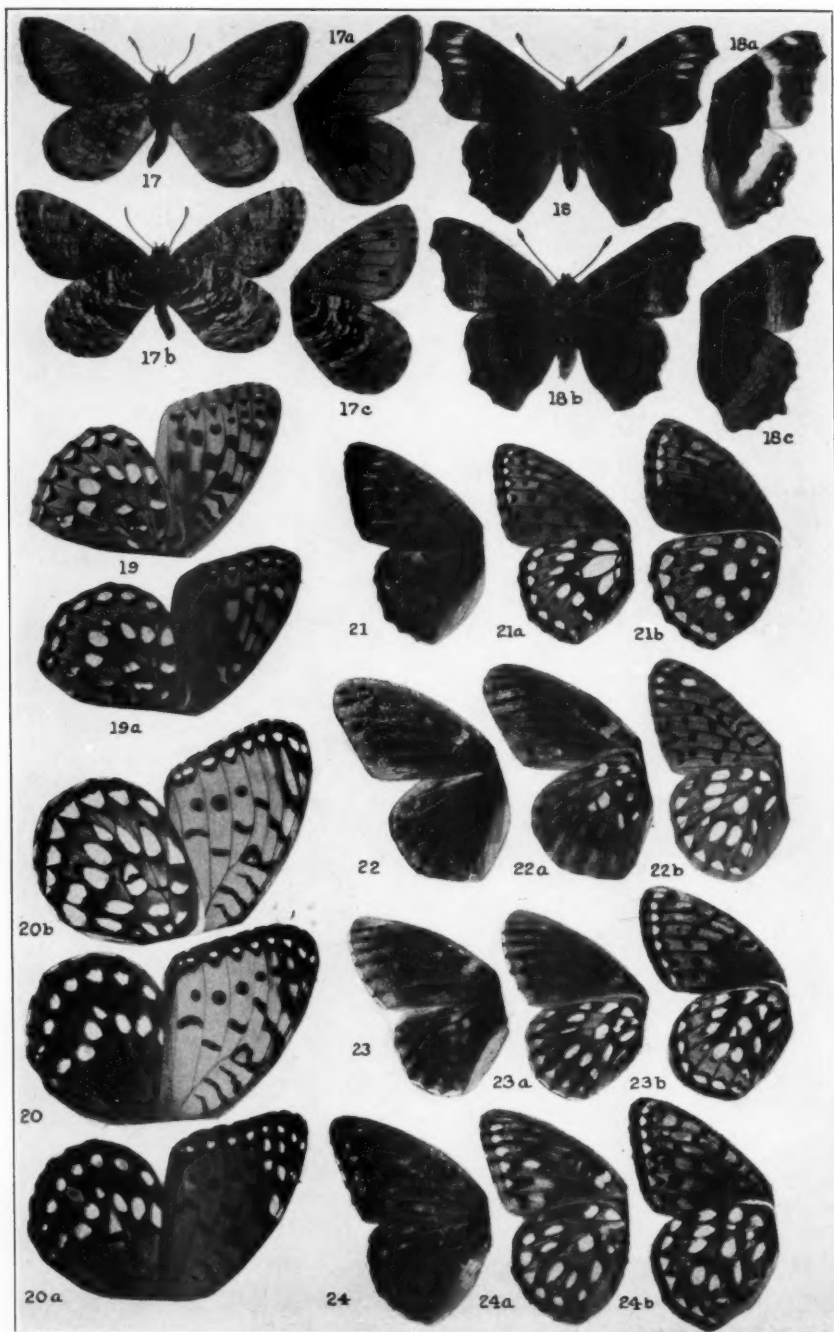


PLATE B.

NEW TRANSITION FORMS—GUNDER.